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ENTERPRISE SYSTEMS JOURNAL

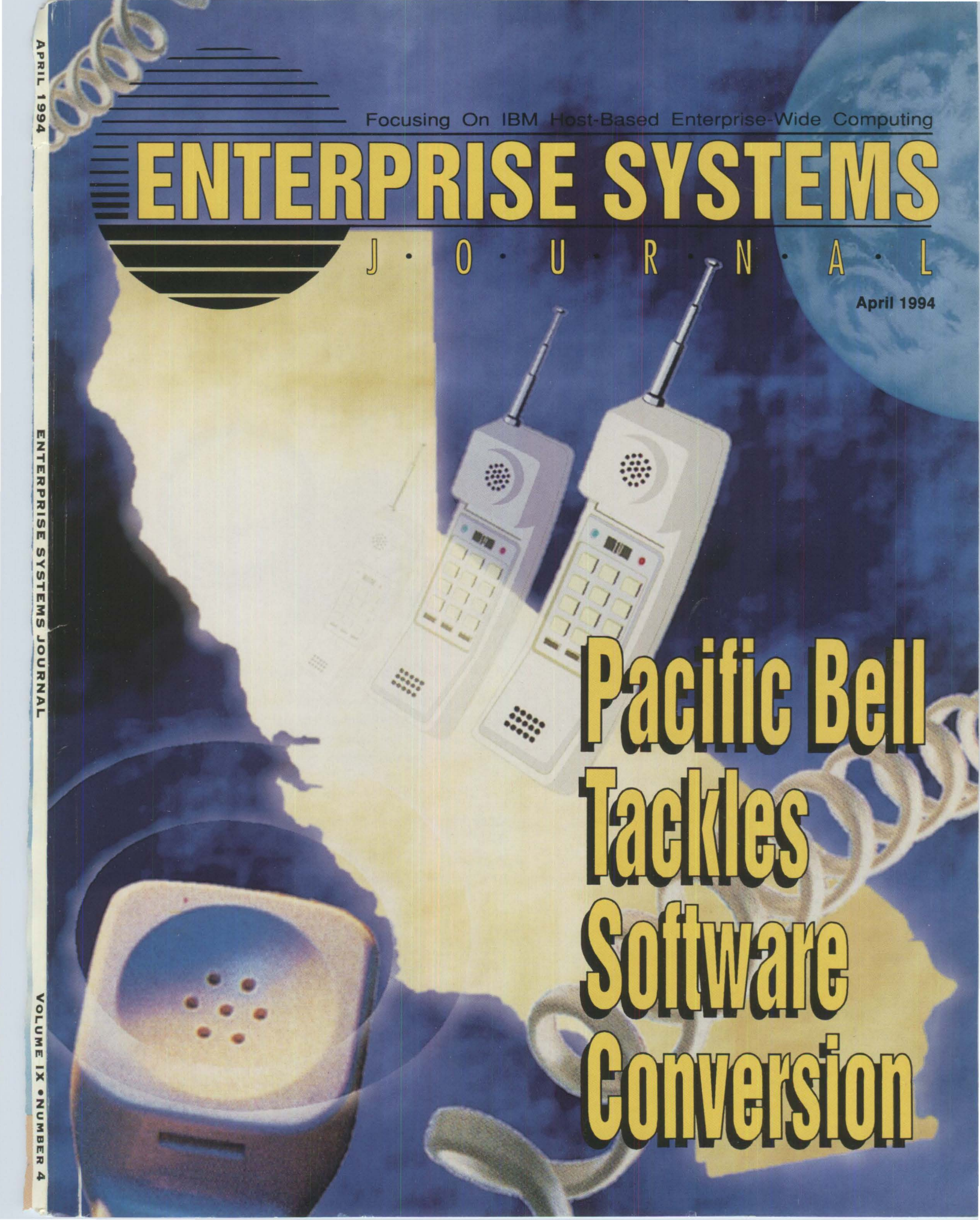
VOLUME IX • NUMBER 4

Focusing On IBM Host-Based Enterprise-Wide Computing

# ENTERPRISE SYSTEMS

J • O • U • R • N • A • L

April 1994



## Pacific Bell Tackles Software Conversion





## I/S MANAGEMENT

- 14 IBM Expands The Role Of The Mainframe:  
An Interview With Nick Donofrio  
*By Philip E. Courtney*
- 20 The Metamorphosis Of I/S: The Dinosaur  
Takes Wing *By Charles B. Kreitzberg, Ph.D.*
- 32 Pacific Bell Tackles Software Conversion  
*By Karen Cook*

## OPERATING SYSTEM PLATFORMS

- 53 Logical Segments In VM/ESA:  
Let's Get Logical! *By Alex Mericas*
- 64 Measuring UNIX Systems: An RMF Bigot's View,  
or how i learned to type in lower case  
*By Charles W. Hopf, Jr.*
- 81 CUNA Mutual Synchronizes  
Multiple MVS Systems *By Philip E. Courtney*

## CLIENT/SERVER ENTERPRISE SOLUTIONS

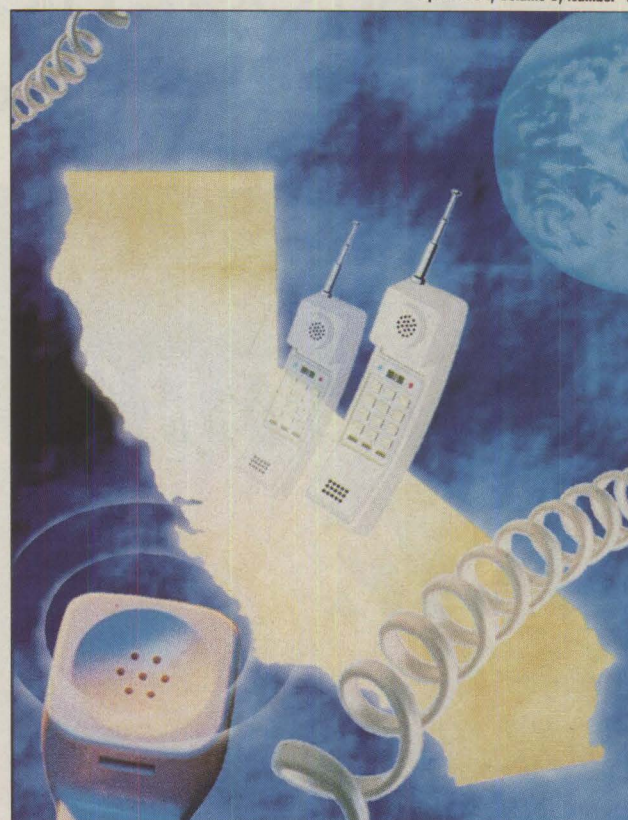
- 39 A Road Map To Client/Server Computing  
*By Bernard Domanski, Ph.D.*
- 72 COBOL Programs In CICS: Packing Space  
*By Ronald Weinger*

## DATABASE MANAGEMENT

- 36 IMS/ESA 4.1: The New Beginning  
*By Jim Martin*
- 76 What's New In DB2/2?  
*By Howard Fosdick*

## STORAGE MANAGEMENT

- 58 Virtualized DASD: Impact On Storage Management  
*By Gary H. Cox and Bradley A. Cahill*



*Would your organization undertake a major data center software conversion project during a holiday season — that also happened to be your fiscal year-end? Pacific Bell proved it can be done by converting not one but six data centers at the end of 1993. To find out the secrets of their astonishing success, turn to Karen Cook's article on page 32.  
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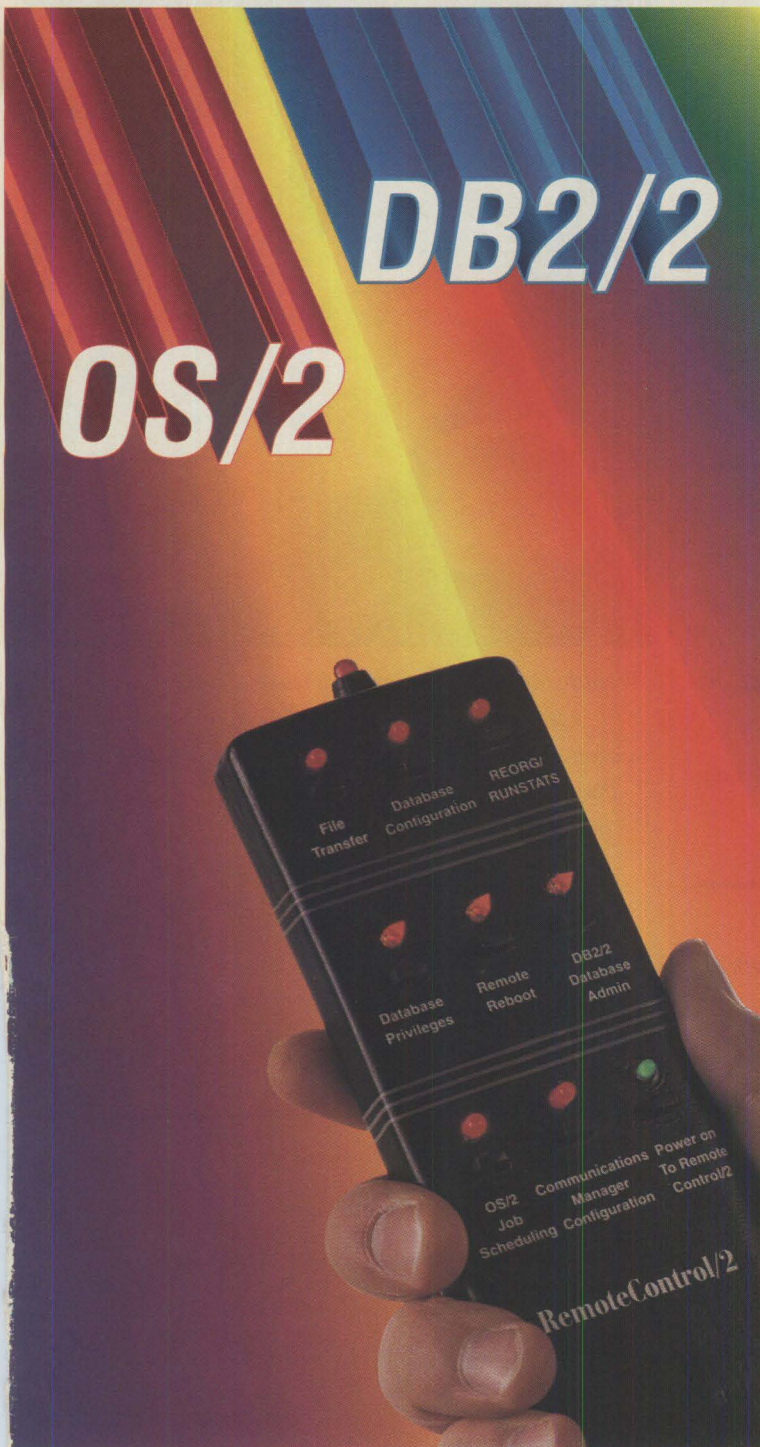
- 8 TOP/X (Landmark Systems Corp.)
- 10 File-AID/RDX (Compuware Corp.)
- 11 Performance Solution (Softworks)
- 12 Resource Optimization Control System (Legent Corp.)
- 13 SAMS:Vantage For MVS (Sterling Software)

## DEPARTMENTS

- |              |                     |          |
|--------------|---------------------|----------|
| 4 Publisher  | 80 Advertiser Index | 88 Humor |
| 6 Inside IBM | 86 Product Update   |          |



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# What's New In DB2/2 ?

The DB2 product family represents a new direction for IBM. It advances strong products for client/server database computing.

Introduced in May 1993, IBM's DB2/2 is the company's database server for OS/2. Based on IBM's OS/2 Database Manager (introduced in 1988), you have to ask: Is DB2/2 truly a new product, or merely "old wine in a new bottle"? Why did IBM rename the product? What's new in DB2/2?

The natural starting point in answering these questions is to investigate the features that distinguish DB2/2 from its predecessor. This article then discusses DDCS/2 and DB2/6000, two companion products that were announced at the same time. It concludes by analyzing IBM's DB2/2 strategy.

DB2/2's new features can be placed in two categories: DB2 compatibility enhancements and performance improvements.

## DB2/2 Compatibility Enhancements

DB2/2's improvements in this area are aimed at making the product more compatible with both DB2 and the rest of the "DB2 product family." "DB2 product family" is IBM's term for its entire line of relational DBMS products, which includes DB2/2, DB2, DB2/VM and VSE (renamed from SQL/DS), DB2/6000 (announced simultaneously with DB2/2) and DB2/400 (renamed from SQL/400). Another way of saying DB2/2 has become more compatible with the DB2 product family is saying it more closely conforms to IBM's formal definition for that family, the Systems Application Architecture (SAA) SQL Level 2 Common Programming Interface (CPI).

DB2/2 is enhanced by the addition of the NOT NULL WITH DEFAULT declaration in the CREATE TABLE and ALTER TABLE statements. This parameter is especially important to data type compatibility when sites download data from DB2 to DB2/2 (used either as a database server on a LAN or as a personal database on a desktop).

DB2/2 now includes DECIMAL, INTEGER and FLOAT scalar functions. These scalar functions convert a number returned from a SQL statement into a format indicated by the function. In this statement:

```
SELECT INTEGER (onhand / totalprice) FROM inventory ;
```

the presence of the INTEGER scalar function ensures the value returned from this query will be an integer.

DB2/2 now has CONNECT statements and an implicit CONNECT that work as they do in mainframe DB2. The statements CONNECT, CONNECT TO and CONNECT RESET can be used in place of the old OS/2 Database Manager statements, START USING DATABASE and STOP USING DATABASE. The implicit CONNECT means if a program issues an initial SQL statement without explicitly issuing a CONNECT (or START USING DATABASE), then the default database defined as an environment variable in the CONFIG.SYS file will be used.

DB2/2 includes a CURRENT SERVER register. Programs interrogate this register to retrieve the name of the database server to which they are currently connected, through a statement such as:

```
SELECT CURRENT SERVER INTO :hostvar
FROM tablename ;
```

Finally, RUN may now be used instead of EXECUTE in GRANT and REVOKE statements for packages. An example of using RUN is:

```
GRANT RUN ON PACKAGE pack_name TO
id_list ;
```

By Howard Fosdick



In total, these SQL enhancements render DB2/2 more compatible with DB2 and the rest of the DB2 product family. It is now easier to develop on a DB2/2 workstation and target DB2 (or some other DB2 family product) for production use of that code. Code portability is enhanced, whatever the motivation for porting may be. And, NOT NULL WITH DEFAULT makes its easier to transport both table definitions and data across platforms.

In general, DB2/2 Data Manipulation Language (DML) and Data Control Language (DCL) are highly compatible with other DB2 family products. Data Definition Language (DDL) is compatible on the logical level but differs when referring to physical storage objects. Those interested in precise SQL differences will want to order the *Formal Register Of Extensions And Differences In SQL (SC26-3316)*. This document, authored by IBM's SQL Language Council, was first published in September 1993.

### DB2/2 Performance Improvements

The big news here is that DB2/2 is fully 32-bit. IBM totally reworked the old 16-bit Database Manager engine. The result is that instruction path length is 20- to 30-percent shorter and the OS/2 DB2/2 platform supports 32-bit performance throughout.

IBM took advantage of this conversion effort to remove some key performance restrictions on DB2/2. First, buffer pool size may now be increased from its old limit of 6MB to a new height of 128MB. Sort heap size (memory owned by an application and used by it for sorting) may be increased from 1.25MB to 62.5MB. This permits more sorts to occur at in-memory speeds rather than requiring disk access. Larger buffer pools, in certain types of data access and under certain patterns of user activity, can enhance performance dramatically.

Another performance enhancement is that users can now control when indexes are rebuilt. Previously, this always occurred at first data access. DB2/2 permits I/S to force this to occur when a database is restarted, thereby minimizing impact on users.

Finally, First Failure Support Tech-

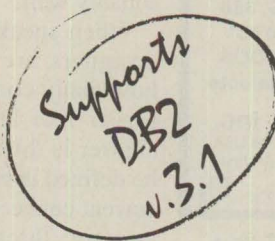
nology/2 (FFST/2) is a DB2/2 feature that collects diagnostic information at the time of failure. This obviates the need to reproduce many software problems and permits more timely identification and correction of any problem with DB2/2.

### Little-Known Goodies, And The Still-Missing

An odd phenomenon is that many

developers are not aware of some DB2/2 features that were present in the product even when it was the OS/2 Database Manager. For example, DB2/2 can recover either to a point in time or to the time of the last committed unit of work. DB2/2 uses its log for roll-forward application of committed units of work. This gives DB2/2 a transactional capability that some competing products lack.

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It has been erroneously reported in the press that DB2/2 does not support stored procedures. The product does, though, through a feature called the Application Remote Interface (ARI). DB2/2 does not, however, provide a 4GL for writing stored procedures. These must be written in a traditional 3GL like C.

Also, DB2/2 does have an EXPLAIN command, but it is not distributed with the product. Ask IBM for a copy. And yes, DB2/2 does have row-level locking

and dirty-read capability!

Finally, some developers just cannot shake their image of IBM products as poor performers. DB2/2, in its present

## Future product enhancements can continue progress towards database copy management and enterprise-wide distributed DBMS.

and past releases, has been benchmarked by several magazines as performing reasonably well.

When speaking of performance, I/S designers are often concerned about how many concurrent users a database server like DB2/2 will support. The answer is this: "Concurrent users" can be defined in either of two ways, as concurrent connections (inactive threads) or as active threads presently performing concurrent database I/O. Any database server (DB2/2 or its competitors) running on common Intel-based machines under OS/2 or Novell Netware with a few disk drives and one or two disk controllers offers only low-end concurrency. Tens of threads may be supported concurrently, but only a handful can do I/O at one time. This is as much a function of limited I/O paths (disk drives, controllers and the operating system) as a limitation of the DBMS itself.

Those looking at larger-volume database I/O need to move up to UNIX database servers and the more sophisticated hardware concurrency (and operating system support) they provide. IBM announced its UNIX-based DBMS product, DB2/6000, at the same time as DB2/2. As a member of the DB2 product family, DB2/6000 is highly compatible with DB2/2. It represents the natural scalability step for DB2/2 users who need more power. DB2/6000 runs on IBM's RS/6000 family of RISC machines and offers all the scalability this implies, from the desktop to mainframe equivalents. DB2/6000 also runs on Hewlett-Packard's HP 9000 and will soon run on other vendors' UNIX machines.

What is still missing from DB2/2? One omission, which affects applications with large databases, is its inability to span a database across more than one disk drive. On-line database backup would be useful for some applications. IBM is said to be working on this as well as table-level backup. Finally, DB2/2 would be strengthened by a Call Level Interface for SQL.

DB2/6000 provides all these features today (including a maximum table size of 64GB). IBM intends to move DB2/6000 features down to DB2/2. They can readily do this since both products share a common code kernel.

## Distributed Data Connection Services/2 (DDCS/2)

Announced with DB2/2, DDCS/2 Version 2.0 is a 32-bit gateway product that runs under OS/2. Add DDCS/2 to DB2/2 and the Communications Manager/2, and you have a "database gateway," a transparent connection to host databases. Now, PC clients on the LAN can:

- Read and update local DB2/2 data residing on their own PCs
- Read and update databases on the DB2/2 database server
- Read and update databases on remote host DBMSes (such as DB2, DB2/VM and DB2/400).

Database access is location-transparent. Programs and queries do not have to know where the data resides, they only have to name the database to which they want to connect. The implications for client/server database and distributed database are mind-boggling. Users can locate data where it makes most sense and relocate it, if necessary, with no impact on application code. The high level of interconnectivity client/server database facilitates means applications can connect to one platform initially and simply redirect their connection to some other (perhaps more powerful) database server later. Finally, the high level of database compatibility between members of the DB2 product family means applications can be developed on one platform and easily migrated to another later.


DDCS/2 is IBM's implementation of the Distributed Relational Database Access (DRDA) protocol for DB2/2 database servers. It supports both

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Continued from page 57

static and dynamic SQL on the target database system. It does not require a mainframe component, such as a CICS program. DDCS/2 is extremely inexpensive when compared to most database gateways that do require mainframe components.

DDCS/2 and DRDA do not access nonrelational data stores such as VSAM and IMS, nor do they support DB2/2's Query Manager.

### IBM's Database Strategy

In upgrading the OS/2 Database Manager to the more capable DB2/2, introducing DB2/6000 and connecting DB2/2 users to host databases, IBM has clearly evolved a new database strategy. The DB2 product family represents a new direction for IBM. It advances strong products for client/server database computing. DB2/2 is now scalable to DB2/6000 and, ultimately, to mainframe DB2. Clearly, IBM is competing "all-out" in an effort to meet users' client/server database needs. Second, these relational products attain new heights of compatibility. Code portability, cross-platform development and transferable skills result. Finally, IBM has laid the groundwork for the evolu-

### IBM took advantage of this conversion effort to remove some key performance restrictions on DB2/2.

tion toward truly distributed database management. Future product enhancements can continue progress towards database copy management and enterprise-wide distributed DBMS. ●

#### ABOUT THE AUTHOR



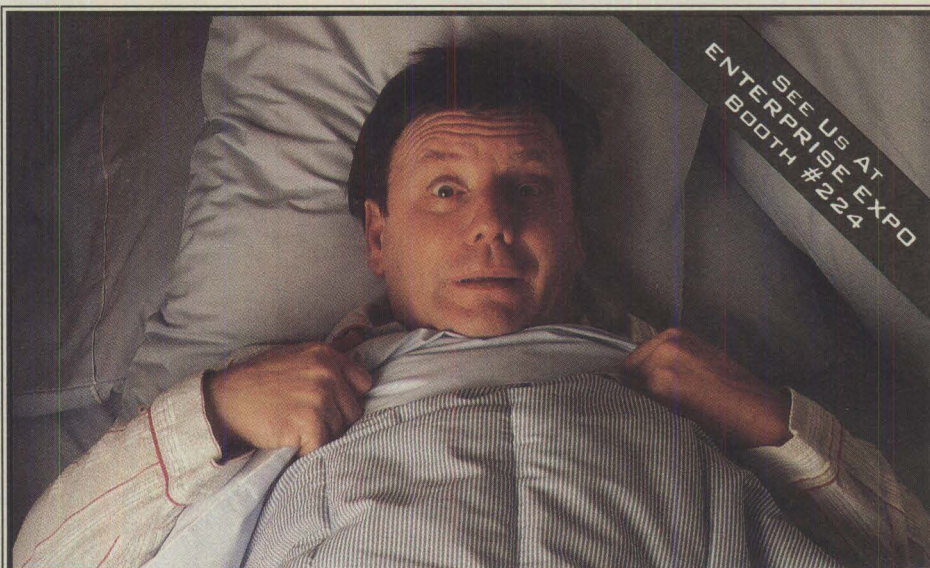
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exploit ESA features and reduce virtual storage constraints. ●

#### ABOUT THE AUTHOR

*Alex Mericas has 12 years experience in VM, the last six as a member of the Westlake Performance Department in the IBM Westlake Programming Lab, IBM Corp., 1 E. Kirkwood Blvd., Roanoke, TX 76299, (817) 962-5044.*



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